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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/671,894	09/26/2003	Herbert Bruder	P03,0333	7996

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EXAMINER	
ARTMAN, THOMAS R	

ART UNIT	PAPER NUMBER
2882	

DATE MAILED: 01/19/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/671,894	BRUDER ET AL.	
	Examiner	Art Unit	
	Thomas R Artman	2882	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *07 December 2004*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-5 and 7-10* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *10* is/are allowed.

6)☒ Claim(s) *1-3,5 and 7-9* is/are rejected.

7)☒ Claim(s) *4* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *26 September 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-3, 5 and 7-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hu (US 5,784,481) in view of Adler (US 6,028,907).

Regarding claim 1, Hu discloses a method for generating an image (Figs.1 and 3), including:

a) providing a CT x-ray device having:

i) a multi-row x-ray detector array 16,

ii) an x-ray radiator 12 rotatable around a system axis Z that emits a conical beam (col.2, lines 58-59),

iii) a positioning device 48 adapted to receive an examination subject 44 for positioning the subject in a direction parallel to the system axis Z;

b) generating raw data by radiating the examination subject with the x-ray beam in a rotational scan to acquire a plurality of projections during at least one revolution or partial revolution of the x-ray radiator around the subject (col.3, lines 9-21), and by a linear scan where transmission values are acquired at different positions of the subject parallel to the system axis Z,

without rotation of the x-ray radiator, with all of the values generated by the linear scan being acquired in a continuous linear scanning movement (col.3, line 48, to col.4, line 18), and

c) generating an image of the subject from the raw data generated by the rotation scan and the linear scan (col.3, lines 39-63).

Hu does not specifically disclose that a topogram is generated with the linear scanning data. According to Hu, the linear scanning data is only used for reconstruction with the circular scan data.

Adler specifically teaches an image reconstruction method that requires using linear scan image data, referred to as "scout data", which is an art-recognized synonym of a "topogram," with the CT scan data in order to complete a 3D reconstructed image (Fig.2, and col.6, lines 1-9). Adler recognizes the convenience having the dual purpose of the scout data (col.6, line 64, through col.7, line 2). The scout scan is performed and the topogram is generated regardless of the reconstruction algorithm because the regions of interest and other operating parameters of the CT system need to be defined. Adler also uses the data in the reconstruction algorithm for improved imaging, and the corresponding data sets for each slice of the scout data and CT data are easily retrieved when both are taken in the same reference frame. This is true of Hu's invention, where the same origin (and hence, the coordinate system and reference frame) is used throughout the method (col.3, lines 17-21).

It would have been obvious to one of ordinary skill in the art at the time the invention was made for the device of Hu to generate a topogram from the linear scan, where the topogram is displayed for purposes of selecting a relevant region of the subject and storing the topogram

until it is needed in the reconstruction algorithm, such that the process is more efficient, as taught by Adler.

With respect to claim 2, Hu further discloses that the transmission values of the continuous linear scanning movement are acquired in direct succession (col.3, lines 48-51).

With respect to claim 3, Hu further discloses that all projections of the rotational scan are acquired in one continuous rotational movement of the x-ray radiator (col.3, lines 12-17).

With respect to claim 5, Hu further discloses that the plurality of projections of the rotational scan are acquired at a single position of the subject in the direction parallel to the system axis Z during at least one revolution of the x-ray radiator around the subject, employing a flat detector (planar detector 16, also see item 52 of Fig.4).

Regarding claim 7, Hu discloses a method for generating an image (Figs.1 and 3), including:

a) providing a CT x-ray device having:

i) a multi-row x-ray detector array 16,

ii) an x-ray radiator 12 rotatable around a system axis Z that emits a conical beam (col.2, lines 58-59),

iii) a positioning device 48 adapted to receive an examination subject 44 for positioning the subject in a direction parallel to the system axis Z;

b) acquiring a linear scan of the subject by measuring transmission values of the subject at different positions of the subject along a direction parallel to the system axis Z, without rotation of the x-ray radiator (col.3, line 48, to col.4, line 18),

c) obtaining raw data of the examination subject in a rotation scan by acquiring a plurality of projections of the subject during at least one revolution of the x-ray radiator around the subject (col.3, lines 9-21), and

d) reconstructing an image of the subject from the acquired linear scan transmission values in combination with the raw data acquired during the rotation scan.

Hu does not disclose the use of the linear scan as a topogram, where the topogram is displayed for selecting a relevant region of the subject in the topogram and then storing the topogram.

Adler teaches an image reconstruction method that requires using linear scan image data, referred to as "scout data", which is an art-recognized synonym of a topogram, with the CT scan data in order to complete a 3D reconstructed image (Fig.2, and col.6, lines 1-9). Adler recognizes the convenience having the dual purpose of the scout data since linear scan data is needed for the reconstruction algorithm (col.6, line 64, through col.7, line 2). The scout scan is performed regardless of the reconstruction algorithm because the regions of interest and other operating parameters of the CT system need to be defined, and the corresponding data sets for each slice of the scout data and CT data are easily retrieved when both are taken in the same reference frame. This is true of Hu's invention, where the same origin (and hence, the coordinate system and reference frame) is used throughout the method (col.3, lines 17-21).

It would have been obvious to one of ordinary skill in the art at the time the invention was made for the device of Hu to display a topogram, where the topogram is displayed for purposes of selecting a relevant region of the subject and storing the topogram until it is needed in the reconstruction algorithm, such that the process is more efficient, as taught by Adler.

With respect to claim 8, Hu executes the rotation scan to cover at least a relevant region.

With respect to claim 9, Hu acquires all of the projections of the rotational scan in one continuous rotational movement of the x-ray radiator (col.3, lines 9-21).

Allowable Subject Matter

Claim 10 is allowed.

Claim 4 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter: the prior art of record neither teaches nor reasonably suggests the additional limitation of, during the rotational scan, acquiring a plurality of projections at each subject position along the Z axis with at least one revolution of the x-ray radiator around the subject, as required by the combination of claim 4.

Claim 10 is allowable for incorporation original claims 1 and 4, thus having the allowable subject matter indicated in the previous Office Action, dated October 5th, 2004.

Response to Arguments

Applicant's arguments with respect to claims 1 and 7 have been considered but are moot in view of the new ground(s) of rejection. However, the same art, and thus the same issues, are present in the current rejection above, and therefore the applicant's arguments must be addressed.

Applicant's arguments filed December 7th, 2004, have been fully considered but they are not persuasive. Applicants argued several points: 1) that the subject matter of original claim 6 was improperly rejected under 35 USC 102(b) over Hu because the examiner admitted in the rejection of original claim 7 that Hu does not teach that feature, and further that the amendment to claim 1 reflects the subject matter of original claim 6, 2) Hu teaches against using data acquired from a combination of circular and linear scan paths for use in a cone beam reconstruction algorithm, 3) a scout scan and a topogram are not art equivalents, and 4) Adler does not provide for such deficiencies in Hu in order to meet each and every aspect of the claims and does not provide motivation for doing so. The examiner respectfully disagrees on all points.

First, the subject matter of original claim 6 stated, "A method as claimed in claim 1 comprising conducting said linear scan as a topogram of said subject." This limitation merely requires that the linear scan is performed the same way as a topogram. A topogram is simply a linear scan with a fixed gantry angle, as is known in the art and defined by Applicant. Then it is clear that Hu's linear scan is "conduct[ed] as a topogram" of the subject, since the linear scan of Hu is linear with a fixed gantry angle. No other use or purpose, such as generating or displaying a topogram image from the data, is implied by such a limitation. The limitation of original claim

7 specifically requires displaying the linear scan data as a topogram for a specific purpose. This limitation is far more specific than original claim 6 and is not disclosed in Hu.

The cancellation of claim 6 and the amendment to the current claim 1 are not equal in scope. The amendment states, "...generating a topogram with..." a linear scan, which implies using the raw linear scan data for a purpose other than that of reconstruction with the circular scan data. Hu does not provide such a teaching.

Therefore, the rejection of original claim 6 under 35 USC 102(b) over Hu was valid in that the limitation was identically disclosed by the reference, and therefore the current claim 1 is rejected under 35 USC 103(a) in view of Adler (more on the Adler reference when point (4) above is discussed). The amendment to claim 1, having a different scope than that of original claim 6, necessitated the new grounds of rejection.

Second, Hu specifically states that other prior art methods using a circular scan and a linear scan had problems associated with their reconstruction algorithms. Hu did not attribute the shortcomings of the prior art to the combination of a circular scan and a linear scan. This is clear from col.1, lines 35-51, where Hu specifically states in lines 35-42 that the combination of a circular scan and a linear scan are "of great practical interest" because the scan paths are easily performed by existing CT gantry-based imaging systems. Further, Hu continues in lines 45-51 by stating that the reconstruction algorithms the prior art uses to generate an image from the scan data are flawed, either being impractical or having various artifacts, inaccuracies, or long processing times.

Further, it is perfectly clear in the cited passages of the above rejection, and in the passages cited by Applicants, that Hu specifically uses a circular scan path and a linear scan path for acquiring the data needed for the reconstruction algorithm (col.3, lines 39-64; col.4, lines 9-17). The examiner has not found any evidence in the disclosure of Hu that would suggest to one skilled in the art that Hu teaches away from the claimed combination of circular and linear scan paths and using the acquired data from both scans in a cone beam reconstruction algorithm.

Third, it is notoriously well known in the art that a "scout scan", "scout view", "scanogram", "topograph", "pre-scan", "scan view", "monitor image", "monitor scan" and "topogram" are synonymous. All of these scans are performed as linear scans with a fixed gantry angle, and they result in 2-D x-ray images of the scanned region. The practice was developed many years ago for the specific purpose of optimizing the subsequent scan parameters and providing an overview of the patient in order to locate the region of interest for further diagnostic imaging (see Liebetruth, US 4,174,481, one of the first patents to disclose the practice of using a fixed angle linear scan for identification of regions of interest of a patient prior to a CT procedure). Scout scans are performed before CT procedures as a matter of course.

Applicants argued that the scout scan was a 2-D X-ray image of the patient, and that such an image was different from a topogram. Applicants' description of a scout scan is accurate; however, Applicants did not explain how they define a topogram and how it allegedly differs from a scout scan. Furthermore, Applicants state in their specification that the topogram is just an overview of the patient, performed as a linear scan with the source and detector at a fixed position, for determining regions of interest from a 2-D image for subsequent imaging (p.2, 2nd

paragraph). Clearly from Applicants' disclosure and common knowledge in the art, scout scans are synonymous with topograms.

Fourth, Adler specifically teaches the practice of using linear scan data both for use as a scout scan and for use in a reconstruction algorithm. Such dual purpose has distinct advantages, as outlined by Adler, in the Abstract and in col.6, line 64, through col.7, line 2, as re-iterated in the above rejection. Further, Adler specifically defines a scout image in col.3, lines 13-16, where the gantry angle is fixed and a linear scan is performed. As Adler specifically states, scout scans are needed for planning and monitoring CT imaging (col.4, lines 14-20).

Therefore, it is clear from Adler's teachings that it is obvious to use linear scan data for both topogram imaging and for reconstruction algorithms, since it is an efficient method of generating the necessary topogram image for planning the subsequent CT imaging while retaining the data for use in the reconstruction algorithm. Hu would obviously benefit from the efficient dual use of the linear scan data since Hu has to have some method of planning and monitoring the CT imaging procedure, and particularly since Hu already acquires the necessary raw data by performing the linear scan.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thomas R Artman whose telephone number is (571) 272-2485. The examiner can normally be reached on 9am - 6:30pm Monday - Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ed Glick can be reached on (571) 272-2490. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Thomas R. Artman
Patent Examiner

Craig E. Church
Primary Examiner